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A dramatically reduced size in the gantry design for the proton-carbon therapy*

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ABSTRACT

Gantries in the proton/carbon cancer therapy machines represent the major cost and are of the largest size. This report explains a new way to the gantry design. The size and cost of the gantries are reduced and their use is simplified by using the fixed magnetic field. The “new” gantry is made of a very large momentum acceptance non-scaling Fixed Field Alternating Gradient (FFAG) quarter and half arc beam lines. The gantry is made of combined function magnets with a very strong focusing and small dispersion function. Additional magnets with a fast response are required to allow adjustments of the beam position for different energies at the beginning of the gantry. Additional strong focusing magnets following the gantry have also to be adjustable to provide required spot size and radial scanning above the patients. The fixed field combined function magnets could be made of small permanent magnets for the proton machine, or of the high temperature superconductors or superconductors for the carbon machine, reducing dramatically the size.

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